

Here is a C# Basics Cheat Sheet covering fundamental concepts, syntax, and examples.

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1. Hello World (Basic Syntax)

```
using System;
```

```
class Program {  
    static void Main() {  
        Console.WriteLine("Hello, World!"); // Output text  
    }  
}
```

- using System; → Includes standard libraries.
- Main() → Entry point of the program.
- Console.WriteLine() → Prints text to the console.

2. Variables & Data Types

```
int age = 25;           // Integer  
double price = 9.99;    // Decimal number  
char grade = 'A';       // Single character  
string name = "John";   // Text  
bool isActive = true;   // Boolean
```

- int → Whole numbers.
 - double → Floating-point numbers.
 - char → Single characters.
 - string → Text.
 - bool → True or False.
-

3. Constants

```
const double PI = 3.14159; // Cannot change after assignment
```

4. Operators

Operator	Description	Example
+	Addition	a + b
-	Subtraction	a - b
*	Multiplication	a * b
/	Division	a / b

Operator	Description	Example
%	Modulus	a % b
++	Increment	a++
--	Decrement	a--

5. Conditionals

```
int num = 10;
if (num > 5) {
    Console.WriteLine("Greater than 5");
} else if (num == 5) {
    Console.WriteLine("Equal to 5");
} else {
    Console.WriteLine("Less than 5");
}
```

6. Switch Case

```
char grade = 'A';

switch (grade) {
    case 'A':
        Console.WriteLine("Excellent!");
        break;
    case 'B':
        Console.WriteLine("Good!");
        break;
    default:
        Console.WriteLine("Invalid grade");
        break;
}
```

7. Loops

For Loop

```
for (int i = 0; i < 5; i++) {
```

```
    Console.WriteLine(i);  
}
```

While Loop

```
int count = 0;  
while (count < 5) {  
    Console.WriteLine(count);  
    count++;  
}
```

Do-While Loop

```
int num = 0;  
do {  
    Console.WriteLine(num);  
    num++;  
} while (num < 5);
```

8. Arrays

```
int[] numbers = { 1, 2, 3, 4, 5 };  
Console.WriteLine(numbers[0]); // Outputs 1
```

9. Methods (Functions)

```
static void Greet(string name) {  
    Console.WriteLine("Hello, " + name);  
}
```

```
Greet("Alice");
```

- static → Methods must be static inside a static class.
- Parameters → Passed inside ().
- Return Value Example

```
static int Add(int a, int b) {  
    return a + b;  
}
```

```
Console.WriteLine(Add(3, 4)); // Outputs 7
```

10. Classes & Objects

```
class Car {  
    public string brand;  
  
    public Car(string b) {  
        brand = b;  
    }  
}
```

```
Car myCar = new Car("Toyota");  
Console.WriteLine(myCar.brand);
```

- Class → Defines a blueprint.
- Object → Instance of a class.

11. Encapsulation (Getters & Setters)

```
class Person {  
    private string name;  
  
    public void SetName(string newName) {  
        name = newName;  
    }  
  
    public string GetName() {  
        return name;  
    }  
}
```

```
Person p = new Person();  
p.SetName("Alice");  
Console.WriteLine(p.GetName()); // Alice
```

12. Inheritance

```
class Animal {  
    public void MakeSound() {  
        Console.WriteLine("Some sound");  
    }  
}
```

```
class Dog : Animal {  
    public void Bark() {  
        Console.WriteLine("Woof!");  
    }  
}
```

```
Dog myDog = new Dog();  
myDog.MakeSound(); // Inherited method  
myDog.Bark();      // Dog's own method
```

13. Polymorphism

```
class Animal {  
    public virtual void Speak() {  
        Console.WriteLine("Animal sound");  
    }  
}
```

```
class Dog : Animal {  
    public override void Speak() {  
        Console.WriteLine("Bark!");  
    }  
}
```

```
Animal myAnimal = new Dog();  
myAnimal.Speak(); // Outputs "Bark!"
```

14. Interfaces

```
interface IAnimal {  
    void MakeSound();  
}  
  
class Dog : IAnimal {  
    public void MakeSound() {  
        Console.WriteLine("Bark!");  
    }  
}  
  
Dog myDog = new Dog();  
myDog.MakeSound();
```

15. Exception Handling

```
try {  
    int x = 10 / 0; // Error  
} catch (Exception e) {  
    Console.WriteLine("Error: " + e.Message);  
} finally {  
    Console.WriteLine("This runs no matter what.");  
}
```

16. Reading User Input

```
Console.Write("Enter your name: ");  
string userName = Console.ReadLine();  
Console.WriteLine("Hello, " + userName);
```

17. File Handling

Writing to a File

```
using System.IO;  
File.WriteAllText("test.txt", "Hello World!");
```

Reading from a File

```
string content = File.ReadAllText("test.txt");  
Console.WriteLine(content);
```

18. Lists

```
using System.Collections.Generic;  
  
List<string> names = new List<string>() { "Alice", "Bob" };  
names.Add("Charlie");  
Console.WriteLine(names[2]); // Outputs Charlie
```

19. Dictionaries

```
using System.Collections.Generic;  
  
Dictionary<string, int> ages = new Dictionary<string, int>();  
ages["Alice"] = 25;  
ages["Bob"] = 30;  
  
Console.WriteLine(ages["Alice"]); // 25
```

20. Asynchronous Programming

```
using System;  
using System.Threading.Tasks;  
  
class Program {  
    static async Task Main() {  
        await DoWork();  
        Console.WriteLine("Main Finished");  
    }  
  
    static async Task DoWork() {  
        await Task.Delay(2000);  
        Console.WriteLine("Work Done");  
    }  
}
```

}

Conclusion

This C# Cheat Sheet covers:

Basic syntax

Variables, loops, conditionals

OOP principles (Encapsulation, Inheritance, Polymorphism)

Exception handling & file handling

Asynchronous programming